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ABSTRACT

To provide a test of the notion that criterial task knowledge facilitates learning and, consequently, performance in studying, a study examined the effects of an explicit prereading task directive and an explicit postreading criterion on the studying behaviors of 40 college undergraduates. After presentation of a prereading task directive prepared in two forms (with and without an explicit statement of question-relevant information), the subjects studied a 4,000 word article on the life of an Irish farmer and completed one of two forms of a question-answering task. Noncriterion task subjects were asked only to list the farmer's hardships and improvements, while subjects in the postreading criterion treatment group were told to list eight hardships and eight improvements. Subjects were also asked to indicate the strategies they employed to learn the material and were given the option of redoing selected questions. The results indicated strong, empirical support for the notion that the more explicit the knowledge of performance expectations, the greater the learner's ability to meet those expectations. The effect for the prereading directive was evident in the large number of directed students who chose to redo selected questions. Finally, those subjects who used more meaning-oriented than text-explicit strategies significantly outperformed others on the question answering task. (FL)

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An Investigation of the Effects of Explicit Criterial-Task Knowledge on the Studying Behaviors of Older, Proficient Readers

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Running Head: Effects of Explicit Criterial Task Knowledge

An Investigation of the Effects of Explicit Criterial-Task Knowledge on the Studying Behaviors of Older, Proficient Readers

The complex, interactive process of reading may be undertaken for various reasons - Reading for meaning, reading for doing or following instructions, and reading for remembering (Baker & Brown, in press; Brown & Campione, 1978). Within the instructional setting the processing of written text is most frequently accompanied by the "requirement to perform identifiable cognitive and/or procedural tasks" (Anderson & Armbruster, 1980, p. 1). It is this special form of student-directed reading that is termed studying (Anderson, 1979, 1980). A model of the studying enterprise can be best characterized as a combination of cognitive and metacognitive components - entry expectations, cognitive goals, cognitive strategies, exit evaluations, storage/retrieval efforts and strategies - that culminate in a performance outcome (cf. Alexander & Garner, in press). The "planfulness" demanded of studying requires the appropriate allocation of attention, effort and strategic behaviors on the part of the learner, facilitated by text, task and self knowledge (Brown,1978, 1981; Brown & Campione, 1978; Chi and Glaser, 1980; Forrest & Walker, Note 1). If the student is inevitably to become an "active agent" in the studying enterprise then it is important to discover "ways of managing studying activities" that facilitate learning (Anderson, 1970, p. 349).

Research findings in the domain of studying have contributed to our understanding of this process - contributions that may lead

to improved performance on the part of the learner. For example, criterial-task knowledge has been shown to have a significant impact on the outcome of studying (Anderson & Armbruster, 1980; Markman, 1981; Alexander & Garner, in press; Garner & Alexander, in press). As an information processing task, studying is highly criterion-oriented. "There is always an end product" involved in learning and the effective student must be "cognizant of this end product" (Brown, 1980, p. 13). The explicitness of the criterion affects how students study and how much they learn" (Anderson, 1980, p. 483). When they must operate with only implicit criteria even older, more proficient readers seem unable to outperform those furnished with an explicit criterial statement (Alexander & Garner, in press; Garner & Alexander, in press). The criterial statement may incorporate such task-relevant information as whether the production demands will be gist or verbatim, recognition or recall, or application. When making the production demands explicit, the task-generator may also choose to specify an expected level of performance.

Anderson and Armbruster (1980) reported that the presence of a criterial task in the pre-reading stage of studying, as in the statement of question-relevant information, resulted in greater student learning than if the criterial task remained vague or unspecified. Similarly, the research of Garner and Alexander (1982, in press) indicated that criterial task knowledge made more explicit in the post-reading question-answering phase of studying produced significant differences in subjects' recall. While the explicitness of a criterial task both pre- and post-reading apparently results in increased learning during studying, it would appear that such performance differences arise from varying forms of "effortful processing" (Campione, Nitsch, Bray &

Brown, 1980, p. 6). Where the criterial statement is incorporated in the pre-reading stages of studying the increased learning demonstrated in the outcome measures would seem attributable to the selective attention of readers to important textual information at the time of storage (cf. Reynolds & Anderson, 1980). In essence, students are made cognizant of information to be tested prior to studying, and therefore become more attentive to relevant text during processing. The result of this "extra-attention to question-relevant information" should be increased learning of the directed textual material (Reynolds & Anderson, 1980, p. 18).

By comparison, where the criterial statement, in the form of a specified level of response production, is incorporated in the post-reading stages of studying, performance differences apparently result from differential allocation of effort at the time of retrieval (cf. Alexander & Garner, in press). The effort-retrieval explanation is reinforced by the fact that all subjects in this post-reading criterial research received the identical pre-reading task directive, which was constructed to be purposely vague — that is, eliminating any clues as to the form or content of the after-reading question-answering task (Garner & Alexander, 1982; Garner & Alexander, in press). Therefore, the nature of the relationship between criterial-task knowledge and studying outcomes, as implied by the presence of the attention-storage and effort-retrieval hypotheses, remains questionable and in need of further empirical test. The purpose of this study is two-fold:

- To provide further and stronger test of the notion that criterial-task knowledge facilitates learning and, therefore, performance in studying.

- To seek evidence for the attention-storage and effort-retrieval hypotheses.

The specific research questions to be addressed by this investigation are as follows:

1. Does the presence of an explicit pre-reading task directive, in the form of a statement of question-relevant information, have a significant effect on subjects' question-answering performance as demonstrated by the number of non-redundant responses called?
2. Does the presence of an explicit pre-reading task directive, in the form of a statement of question-relevant information, have a significant effect on subjects' strategic behavior as demonstrated by their second efforts at task?
3. Does the presence of an explicit post-reading criterion, in the form of a specified level of response production, have a significant effect on subjects' question-answering performance as demonstrated by the number of non-redundant responses called?
4. Does the presence of an explicit post-reading criterion, in the form of a specified level of response production, have a significant effect on subjects' strategic behavior as demonstrated by their second efforts at task?
5. Do subjects' externally-demonstrated and verbally-reported studying behaviors have a significant effect on their question-answering performance as demonstrated by the number of non-redundant responses called?

Method

Subjects

Forty undergraduate students enrolled in two sections of a reading methods course at Texas A&M University were the subjects for this investigation. All subjects participated in the study as partial fulfillment of course requirements. A 2x2 factorial design was employed and subjects were randomly assigned to one of four treatment groups - Non-directed non-criterion (NDNC), Non-directed criterion (NDC), Directed non-criterion (DNC), and Directed criterion (DC). One-fourth of all subjects were assigned to each treatment group.

Subjects were judged to be proficient readers by the instructor (i.e., able to cope successfully with the text-learning tasks in the course). The decision to employ older, proficient readers was partially based on the emphasis placed on memory in the performance of the question-answering task in this investigation. Research in memory indicates that memorial development is age-related (e.g., Brown, 1975; Brown & Campione, 1978; Campione & Brown, 1978; Howe & Ceci, 1979). Mature memorizers, who are confronted with the task of committing text to memory, would have at their command an "impressive array of strategic devices" (Campione & Brown, 1978, p. 410). Whether they choose to employ these strategies is yet another question. Further, by selecting proficient readers as subjects, differences in performance would not be assumed to arise from decoding deficiencies. These characteristics of older, proficient readers were considered critical to the successful completion of the studying task

incorporated in this study.

Materials

For the purposes of this investigation an approximately 4,000 word article on the life of an Irish farmer was selected (McCarthy, 1964). With an understanding that there are some limitations to the traditional text classification scheme (cf. Spiro & Taylor, 1980), this material will be described as predominately expository with some narrative tendencies. The presentation of information within the article largely follows a problem-solution organization ordered in the temporal manner with a generally linear sequence of events (cf. Meyer, 1975). This temporal congruity between presentation and representation of textual events would appear to facilitate comprehension by making temporal reordering for recall unnecessary (Spiro & Taylor, 1980). The narrative tendencies of the text result primarily from the presentation of general information about Irish farmers, through the specific character of Paddy Dolan. The memorability of the character, Paddy, would seem to increase the memorability of the knowledge conveyed through his character (Bower, 1978). In short, the passage maintains the contractual agreement between reader and writer in terms of its grammaticality and flow, and, therefore, can be conceived of as "considerate" (Kantor, 1978) or "well-formed" (Stein & Glenn, 1978) text, conducive to recall.

This particular selection was chosen for use in this investigation for several additional reasons. First, the extended length of the text was a principal factor in the selection process. The volume of textual material furnished adequate information for the preparation of several text-based questions sufficiently challenging to the memories

of older, proficient readers. The extended text was also considered favorable to the discrete paragraphs (Rickards, 1979) and artificially-generated materials (Howe & Ceci, 1979) employed in many laboratory investigations. To maintain the "naturalness" of this text the article format was presented unaltered to subjects within the course of their regular class sessions. It was of major concern to the investigation to make the task and the text as "ecologically valid" (Snow, 1974) as possible.

An added feature of the article and a factor in its selection was the distinct and balanced division between the negative elements, or hardships, in the character's life as an Irish farmer and the positive elements, or improvements, mentioned. Also, the text was structured in such a way as to provide two naturally occurring occasions of incidental learning. One occasion described the background of the tinkers while the other explained the use of peat as fuel. This supplemental information was blocked and centered in text on the page in which it was referenced.

Attached to the passage, subjects received either a general (non-directed) or specific (directed) goal-setting directive. For the 20 non-directed subjects the pre-reading task directive was as follows:

> Study the enclosed material on the Irish farmer until you feel able to answer several questions about the content. You may use any technique or strategy that will help you learn the material.

The non-directed subjects were made cognizant of the general form of production demands, that of a question-answering task, but

were not furnished any information relative to the form or content of those questions. The 20 directed subjects, by comparison, were given information relative to an area of textual information to be tested. The pre-reading task directive for these subjects was as follows:

> Study the enclosed material on the Irish farmer until you feel able to answer several questions about the content. Pay close attention to the hardships the Paddy Dolan's have faced over the past forty years. You may use any technique or strategy that will help you learn the material.

Presented separately to each subject was a question sheet containing four questions. The first was a text-based question (Cunningham, Cunningham & Arthur, 1981) - requiring information found within the text - that related to the pre-reading task directive provided the directed subjects. This question was presented in two forms varying only in its inclusion or exclusion of a specified criterion. The placement and spacing of all questions was maintained. Subjects randomly assigned to the non-criterion group received the following form of question one:

> What hardships have the Paddy Dolan's faced over the past forty years?

Subjects assigned to the criterion group received a more explicit guide as to response demands:

> What hardships have the Paddy Dolan's faced over the past forty years? List 8 hardships.

The request for eight (out of a possible 14) hardships was

considered by the investigator to be a high, though realistic, criterion that would sufficiently tax the memory of subjects.

In similar fashion, the second question, concerned with more positive aspects of the Irish farmer's life, was developed in two forms. For the non-criterion group the question read as follows:

> How has the Dolan's life as farmers improved through the years?

Criterion group subjects received the additional response information to "list 8 improvements" out of the possible 13 presented in text.

For all subjects, questions three and four were identical. Question three was a reader-based question requiring subjects to speculate as to the overall quality of Paddy Dolan's life.

> Do you think Paddy Dolan is pleased with his life as an Irish farmer? Explain your answer.

Question four asked subjects to "describe the background of the tinkers".

The form, mode and placement of the questions in the question-answering task were carefully considered. The first question processed by subjects was a repetition of the pre-reading task directive and was presented for initial response to measure the direct consequences of the pre-reading statement (Anderson & Biddle, 1975). The second question was ordered to assess the indirect consequences of the pre-reading directive on a new rather than repeated item. Further, as the text organization followed the problem-solution pattern, so, too, did the question-answering task. Question one, focusing on the problems (hardships) of the farmer, was followed by question two, surveying the solution (improvements). Short answer/completion questions were

selected for use in this investigation since the research seems rather conclusive that direct and indirect effects are stronger with this form (cf. Anderson & Biddle, 1975). A written response mode was chosen for a similar reason and all questions initially were answered in the absence of text.

In addition to the question sheet, subjects were asked separately to report the techniques or strategies they employed to learn the material and to rate their performance on the question-answering task. Subjects could evaluate their response production as either poor, fair, good or very good. On a separate sheet subjects were also furnished an option either to terminate the instructional episode or to expend additional energy on the task. If subjects chose the latter option they were requested to indicate which of the four questions they would reanswer and were supplied with the text. Those subjects electing to redo the question-answering task were then provided an identical question sheet on which to record their responses and a second rating sheet on which to re-evaluate their performance.

Procedure

The investigator met with subjects within their regular classroom setting. No time constraints were placed on the completion of the experimental task. No subject exceeded 75 minutes in task completion. The rather complex procedure was scripted and rehearsed by the investigator to ensure a more systematic operation. The procedural plan followed during the investigation included:

1. Distribute pre-reading task directive and attached text;

2. Retrieve the text packet from subject and distribute the appropriate question sheet as determined by treatment group;
3. Collect the initial question sheet from subject and supply him/her with the sheet requesting a report of applied strategies and performance evaluation;
4. Provide subject with the task option sheet after retrieving the evaluation sheet;
5. Optionally (if the choice to redo the question-answering task is made), furnish subject with the appropriate, identical question sheet and the experimental text;
6. Present subject with a second performance evaluation sheet.

Results

To examine the effects of an explicit pre-reading task directive and an explicit post-reading criterion on subjects' question-answering performance, responses to the first two questions were examined. These responses were compared to a protocol of text-explicit answers deemed by the investigator to be acceptable and non-redundant responses matching protocol were then scored as correct. The number of correct responses for each of the two questions for each of two rounds was then subjected to a 2x2 ANOVA. Several significant results emerged from the data.

For question one and question two in round one, the first effort at the question-answering task completed in the absence of text, a significant main effect for criterion was calculated, $F_{(1,39)}=11.618$, $p<.01$ and $F_{(1,39)}=17.80$, $p<.01$ respectively. However, no significant effect for directive and no significant interaction between criterion and directive were found. Means for question one and two, round one, are displayed in Table 1.

Insert Table 1 about here

Similar effects for criterion and directive on subjects' question-answering performance on questions one and two, round two, were noted. Round two signifies the second effort at task completed with the assistance of text. Yet, for question one - the focus of the pre-reading task directive - a significant main effect for directive, as well as for criterion, did result, $F_{(1,39)}=4.16$, $p<.05$ for directive and $F_{(1,39)}=19.36$, $p<.01$ for criterion. For question two, as in round one, a significant main effect for criterion only was calculated, $F_{(1,39)}=40.33$, $p<.01$. Means for questions one and two for round two of the question-answering task are presented in Table 2.

Insert Table 2 about here

An additional question to be asked of the data relates to whether the presence of the pre-reading directive to attend to the hardships listed in text resulted in a significant difference in performance between question one and two for directed subjects. It might be speculated that subjects selectively attending to the negative elements of the text, or hardships, assessed in question one would recall less of the positive elements, or improvements, assessed in question two. The results of a one-way ANOVA did not support this hypothesis. No significant difference in the number of non-redundant responses for question

one and two, round one, for directed subjects was found, $F_{(1,39)}=2.48$, $p > .05$. Such findings suggest that no appreciable differences in performance on repeated and new questions in this study resulted from the presence of a pre-reading task directive. However, if only the responses of the directed non-criterion (DNC) subjects are analyzed, a significant difference in the number of non-redundant responses to questions one and two is calculated, $F_{(1,18)}=3.306$, $p < .05$. This result indicates that in this study subjects given the directive to attend to the hardships and operating in the absence of a mediating criterion did recall significantly more hardships than improvements during the first round of the question-answering task.

Also under test in this investigation was the question of what effect the presence of an explicit pre-reading task directive and an explicit post-reading criterion would have on subjects' strategic behavior as evidenced by their second efforts at task. Statistical analysis of this question was performed by means of Chi-square Goodness-of-Fit. Results of this analysis demonstrated a significant directive by effort effect (Corrected X^2 (1) = 4.1, $p < .05$). Seventeen of the 20 directed subjects as compared to the expected 10 of 20 non-directed subjects, selected the option of reanswering selected items on the question-answering task with textual assistance.

Of related importance to the issue of <u>who</u> chose the reanswering option is the issue of <u>what</u> questions were selected by subjects for reanswering and whether this second effort at task had a significant effect on subjects' response-performance and exit evaluations. Question four on the question-answering task was overwhelmingly designated by subjects electing to redo task. Specifically, of the 38 questions designated for reanswering by subjects, four were question one, seven were question two, four were question

three, and 23 were question four. Question four of the question-answering, it should be remembered, assessed subjects' knowledge of naturally-occurring incidental material. The data, with regard to question selection, strongly suggest subjects' dissatisfaction with the attention allotted this body of incidental information during the storage process and their subsequent dissatisfaction with the amount of this information retrieved from memory. Further, six of the seven expressing displeasure with their performance on question two were directed subjects. This finding may arise from the disproportionate attention given the positive textual elements evaluated by question two in comparison to the directed, negative elements measured by question one.

Due to the predominance of subjects electing to reanswer the incidental-learning question - number four of the question-answering task - performance on this particular item from round one to round two was analyzed to determine potential effects. Employing a conservative test analysis for this repeated measures component of the experimental design (Dayton, 1970), a significant difference in response-performance on question four for round one was demonstrated, $F_{(1,45)}=29.998$, $p<.01$. The same statistical test found a significant difference in exit evaluations from round one to round two for the 23 subjects reanswering question four, $F_{(1,45)}=13.84$, $p<.01$. In determining subjects' performance-rating a four point scale corresponding to the four-point evaluation sheet was used, with one representing poor, to four representing very good. The significant improvement in response-performance on question four was appropriately reflected in a significant rise in subjects' task-evaluations.

The final question examined by this investigation involved the externally-demonstrated and verbally-reported strategies employed by subjects during the studying episode. Of specific interest was what strategies were used, and whether these strategic behaviors had any significant effect on response-production. A determination of externally-demonstrated study strategies was made by examining each subjects' textual material for evidence. It should be noted that while subjects were also provided with blank paper on which to record or outline relevant information, no subject in the investigation made use of this available strategy. All external evidence of strategic behavior - underlining, circling, margin notes - was found on the actual pages of text.

Verbally-reported strategies, those listed by subjects in response to the request to describe techniques and strategies employed to learn the material, and those externally-demonstrated were then combined and categorized. These subject-reports were employed with consideration of the potential disparity between process and verbal product (cf. Ericsson & Simon, 1980; Nisbett & Wilson, 1977). As previous research has indicated subjects may report undemonstrated behaviors (Brown & Lawton, 1977; Garner & Reis, 1981) or they may report using strategies they think they should be using (Baker, Note 2). Still it remains critical for researchers to externalize process (Brown, 1981; Garner, Wagoner, & Smith, Note 3) and do so in a way that minimizes the process - verbal product disparity. The verbal-report data compiled in this investigation, best described as retrospective generalizations about mental processes, were collected within short duration of task performance. By minimizing the interval between process and verbal product it was felt that memory of

mental processes would be less confounded (White, 1980). Further, verbal-report data did not serve as the only source of strategic information but were analyzed concurrently with external evidence. Verbal reports collected in this manner made it possible to check for "consistency of the reports with the other behavior" (Ericsson & Simon, 1980, p. 247), with the external information providing some verification of largely unverifiable internalized data. To illustrate, no subject in the present investigation who reported using the strategy of underlining failed to display underlining of text and no subject underlining text failed to report this as an applied strategy.

Following the examination of verbally-reported and externally-demonstrated strategic information, three study-strategy categories were constructed (see Table 3). These categories, variations of the study-categories employed by Farr and Mitchell (Note 4), were constructed to reflect the nature of subjects' dependency on textual information during the studying process. Two raters classified subjects into one of these categories according to the least text-dependent strategy demonstrated or reported, with "Text-Explicit" considered the most text-dependent strategy and "Meaning-Oriented" representing the least text-dependent. Inter-rater agreement for the classification component of analysis was 100%. One subject failing either to report or demonstrate strategic behavior was removed from analysis for this statistical test. As indicated in Table 3 the majority of subjects were classified within the "Text-Explicit" category of study-strategies. Subjects' response production to questions one and two in round one were each analyzed by category by means of a one-way ANOVA, and a significant difference in performance calculated for question one, $F_{(2,38)} = 5.225$, $p < .05$.

No significant difference was found for performance on question two, however, $F_{(2,38)} = .0345$, $p > .05$. Means and standard deviations for the study-strategy categories are displayed in Table 3.

Insert Table 3 about here

Underlining was by far the most prevalent externally-demonstrable strategy employed by subjects in this investigation. This text-dependent strategy, therefore, was singled out for further analysis. (Thirty-two of the forty subjects in this study underlined some portion of the text). Of particular interest were the questions of whether there were any quantitative differences between directed and non-directed subjects with regard to text underlined, and whether any qualitative differences could be observed. To determine quantitative differences a calculation of underlined text was made by tallying the number of sentences or sentence-segments underlined. In the scoring procedure, no sentence could receive a score greater than one for each subject, regardless of the number of segments within that sentence that were marked. The sum of these scores for each of the two treatment groups - Directed and Non-Directed - was then subjected to a one-way ANOVA. There was no significant difference in the amount of text underlined for directed and non-directed subjects, $F_{(1,39)} = .3836$, $p > .05$. The means for the directed and non-directed subjects were 19.95 and 24.8, respectively. Further, qualitative analysis of the text markings did not reveal any notable differences in the textual material underlined for these two groups. Among the general patterns in subjects' underlining strategy that were observed were that first and last sentences of paragraphs were often underscored, more underlining occurred in the first than

in the second half of the six page text, and sentence segments containing numerical references were frequently marked.

Discussion

One purpose of this investigation was to examine the impact of an explicit pre-reading task directive and an explicit post-reading criterion on the question-answering performance of proficient readers. In terms of the impact of criterial-task knowledge on learning outcomes, the current investigation produced strong, empirical support for the notion that the more explicit the knowledge of performance expectations, the greater the learner's ability to meet those expectations. This empirical support was manifested in several ways. For subjects in this investigation, explicit knowledge of expected performance level, in the form of a high, realistic criterion, presented at the time of retrieval had a significant effect on response production. Between criterion and non-criterion subjects there was a significant difference in the number of non-redundant responses generated on the question-answering task for item one, focusing on the hardships in the farmer's life, and item two, surveying improvements in life style. This difference was evidenced in both round one of the task, representing memorial production, and round two, a cumulative total of responses produced with textual assistance. Criterion subjects consistently outperformed non-criterion subjects and even outperformed directed, non-criterion subjects on question one of the question-answering task - an almost verbatim restatement of the explicit task directive. Such differences in memorial production would seem to suggest that, for criterion subjects, the post-reading

statement of expected performance level instigated greater cognitive effort during retrieval. These findings clearly replicate the earlier post-reading criterial research (Alexander & Garner, in press; Garner & Alexander, 1982, in press) with regard to the potent effects of criterion on adults' studying behavior.

By comparison, the significant effect for the explicit pre-reading task directive was manifested in subjects' second efforts at task, rather than in their memorial production. A significant number of directed over non-directed subjects elected to redo particular items on the question-answering task. Working with the assistance of text, subjects choosing the reanswering option significantly improved their response production, as demonstrated by the analysis of performance on the incidental-learning question, item four. Significant improvement in response production was appropriately reflected in a corresponding rise in subjects' performance evaluations. Analysis of exit evaluation sheets indicated that the proficient readers in this investigation choosing the reanswering option accurately monitored their performance in relation to improved response production from round one to round two. In essense, it was the presence of an explicit pre-reading task directive that apparently lead subjects to undertake this second effort at task in significant numbers.

The second purpose of this investigation was to seek evidence for the attention-storage and effort-retrieval hypotheses. In this regard, the findings of the study, while contributing information pertinent to this dilemma, are less conclusive. Certainly, on the basis of the extensive research in the area of question-effects (e.g., Anderson, 1970;

Anderson & Bibble, 1975; Frase, 1967, 1968; Rothkopf, 1966) empirical support for the mathemagenic explanation of questioning (Rothkopf & Bisbicos, 1967) was anticipated. The mathemagenic hypothesis would seemingly lead to several expected results in studies, such as the current, that provide readers with statements of question-relevant information. First, subjects made cognizant of question-relevant information should expend more cognitive energy on the appropriate textual material during the storage phase of studying. Deliberate decisions about mode of response, question format, and response delay were made in this study to enhance this likelihood of direct effects. By attending more closely to question-relevant text, directed subjects, it might be assumed, would have done significantly better than non-directed subjects on the repeated item of the question-answering task. Such was not the case. Analysis of memorial production for question one - the repeated test item - showed no significant effect for presence or absence of the pre-reading directive.

Second, the mathemagenic hypothesis offers an explanation of the fact that question-relevant statements provided prior to reading have a negative effect on new test items. This would suggest that, for directed subjects, there was a likelihood of a significant difference in response production between repeated test item, one, and new test item, two. Again, such was not the case.

In view of the absence of any significant effects for the explicit pre-reading task directive on subjects' memorial response production, the current investigation appears to support the effort-retrieval hypothesis. However, this support should be carefully weighed in light of several caveats relative to task and text. First, in earlier

question-effect research, statements of relevant information presented before or after reading were, for the most part, questions requiring only one or two word responses (e.g., Frase, 1967, 1978; Reynolds & Anderson, 1980; Rothkopf, 1966). The current investigation directed subjects to attend to more text-encompassing information and required them to produce more elaborate responses than one or two words. However, it is Anderson's (1980) contention that subjects given pre-reading criteria or objectives that were too limited in scope would have no need to move out of the pre-reading stage of studying and into the more complex, interactive stages. The desire to include a pre-reading task directive that demanded substantial inter-text processing may have diminished the effect of the directive on subjects' response production evidenced in the earlier research.

Differential learning, according to Jenkins (1978), may result from the nature of the material in interaction with the criterial task, learner and learning activities. Perhaps, the nature of the material employed in this study might serve to explain the ineffectiveness of the explicit pre-reading directive with regard to subjects' memorial production. As described earlier, the text selected for use in this investigation was chosen, in part, for its comprehensibility. This determination of comprehensibility was made on the basis of the text's problem-solution organization, temporal ordering of information, and strong characterization. Consequently, it might be speculated that the comprehensibility of the text may have diminished the effect of the pre-reading directive on performance. Were the text less "considerate", the effect of an explicit pre-reading task directive on performance may have been greater.

This viable explanation, however, as with the preceding one, is in need of empirical test.

The attention-storage hypothesis does appear to get some empirical support in terms of results for second-effort at task. A significant number of directed subjects chose to redo specific items on the question-answering task. This finding could be rationalized on the basis that directed subjects selectively attended more to the hardship elements in text and less to the positive and incidental textual elements. Disproportionate attention leading to dissatisfaction with performance becomes a plausible explanation for the results on second effort in this study.

When the questions designated for redoing by subjects were surveyed, it became apparent that the question assessing knowledge of naturally-occurring incidental material was overwhelmingly the focus of subjects' performance dissatisfaction. It is understandable that subjects would have attended less to less-textually important information. Surprisingly, subjects redoing the question-answering task did not take the opportunity to re-examine their responses to the first and second questions with the assistance of text especially in light of the importance and scope of material covered by these questions. Second-effort subjects apparently applied this redoing option as a specific "fix-up" strategy to repair obvious gaps in performance rather than as a general technique to improve overall task performance.

The final area under investigation in this study dealt with what study strategies subjects employed and the apparent effectiveness of these strategies. Certainly no one can be sure what individuals are doing when they are studying text but the analysis of externally-demosntrated and

verbally-reported data provided by subjects in this investigation functioned as an effective clue to strategic behavior. No attempt was made by the investigator to train subjects or to otherwise entice then into applying any particular strategy. It was the objective of this study to examine normal rather than induced studying behaviors of readers working in a natural rather than artificial environment with considerate rather than contrived text. The resulting data demonstrated a predominance of textually-explicit strategies especially underlining. Such findings support the view that students engage in more familiar types of studying activities such as notetaking and underlining — strategies that have been shown to be ineffective in facilitating recall (cf. Anderson, 1980).

Students employing meaning-oriented strategies - strategies employing a major intrusion into the reading process (Anderson, 1980) - did significantly better than their more text-bound counterparts on the directed task item. Garner and Alexander (1982) found that subjects verbalizing a question-formulation strategy during the studying process significantly outperformed subjects who did not verbalize a question-formulation plan. It could be that the pre-reading directive and article title, "The Farmer's Hard Struggle", instigated such a question-formulation strategy among some subjects. Further, a question-formulation strategy focusing on either the pre-reading directive or article title would seem most facilitating to response production on the first, "hardships", item in the question-answering task. In lieu of empirical test, this explanation remains, at best, speculative. Certainly, a quantitative and qualitative analysis of underlined text produced no evidence of differences between directed and non-directed subjects.

In addressing the specific research questions posed, this investigation has fulfilled its stated purposes to varying degrees. Strong support for the notion that explicit criterial-task knowledge does facilitate recall from text did emerge. Yet, evidence for the effort-retrieval and attention-storage hypotheses was less conclusive. Plausible explanations for the absence of significant direct effects for the explicit pre-reading task directive were posited. However, without specific empirical evidence to substantiate these explanations, this investigation remains as tentative support for the effort-retrieval, and not the attention-storage hypothesis, in relation to the memorial response production of proficient adult readers. Strong evidence for these hypotheses can only result from continued, systematic investigations of the studying enterprise conducted under diverse, controlled settings. Considering the critical role studying plays in the acquisition of knowledge and learning in the school environment further examination of this complex phenomenon is clearly warranted.

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Table 1

Table of Means for a Two-Way ANOVA for Non-redundant responses on Round One by Question

	Non-Directed	Directed	M
Question 1			
Non-Criterion	4.1	5	4.55
Criterion	6.4	6.2	6.3
M	5.25	5.6	
Question 2			
Non-Criterion	4.5	3.9	4.2
Criterion	6.3	5.7	6
M	5.4	4.8	

Table 2

Table of Means for a Two-Way ANOVA for Non-redundant responses on Round Two by Question

	Non-Directed	Directed	M
Question 1			
Non-Criterion	4.1	5.3	4.7
Criterion	6.4	7.1	6.75
M	5.25	6.2	
Question 2			
Non-Criterion	4.5	3.9	4.2
Criterion	6.4	7	6.7
M	5.45	5.45	

Table 3

Table of Means and Standard Deviations for Study-Strategy Categories

Study-Strategy Category	Question One M	Question One Sd	Question Two M	Question Two Sd
Text-Explicit (N=22)				
Underlining				
Circling				
Rereading	5.09	1.98	5.14	1.52
Pacing				
Skimming				
Text-Implicit (N=6)				
Sequencing				
Summarizing	3.8	1.73	5	1.29
Categorizing				
Margin Notes (Paraphrasing)				
Meaning-Oriented (N=11)				
Imaging (Picturing)				
Questioning	6.27	1.14	5.09	1.93
Inferencing				
Predicting				